Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ADRIAN S. BUTTER, JOHN M. KACZMARCZYK, AGNES Y. NGAI, EDWARD F. WESTERMANN, and ROBERT J. YAGLEY

Appeal No. 1999-2449
Application No. 08/745,584

ON BRIEF

Before THOMAS, DIXON, and LEVY, Administrative Patent Judges.
LEVY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection[1] of claims 1-3, 5-9, 11, 12, and 15-17.

[1] The rejection of claim 13 has been withdrawn by the examiner (answer, page 2). Claims 4, 10, and 14 have been canceled (brief, page 2).

BACKGROUND

Appellant's invention relates to flexible motion estimation architecture. An understanding of the invention can be derived from a reading of exemplary claims 1 and 15, which are reproduced as follows:

1. A method of temporal compression of a digital video data stream, comprising the steps of:

hierarchically searching in at least one hierarchical search unit for pixels in a reference picture to find a best match macroblock therein corresponding to a current macroblock;

constructing a motion vector of offset between the best match macroblock and the current macroblock;

passing the motion vector from the at least one hierarchial search unit to a refinement search unit; and

performing a refinement search around the offset of the best match macroblock.

15. A search processor for digital video motion estimation, said search processor comprising:

a hierarchical search unit; and

a refinement search unit connected to the hierarchical search unit via a best match diff/offset bus.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Gonzales et al (Gonzales)	5,414,469	May 9, 1995
Kopet et al (Kopet)	5,448,310	Sep. 5, 1995
Greenfield et al (Greenfield)	5,526,054	Jun. 11, 1996

Claims 1, 2, 5-9, 15, and 16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Gonzales.

Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Gonzales in view of Kopet.

Claims 11, 12, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gonzales in view of Greenfield.

Rather than reiterate the conflicting viewpoints advanced by the examiner and appellants regarding the above-noted rejections, we make reference to the examiner's answer (Paper No. 12, mailed May 21, 1999) for the examiner's complete reasoning in support of the rejections, and to appellants' brief (Paper No. 11, filed February 22, 1999) and reply brief (Paper No. 13, filed July 23, 1999) for appellants' arguments thereagainst. Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the brief have not been considered. See 37 CFR 1.192(a).

OPINION

In reaching our decision in this appeal, we have carefully considered the subject matter on appeal, the rejections advanced

by the examiner, and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer. Upon consideration of the record before us, we reverse.

We begin with the rejection of claims 1, 2, 5-9, 15, and 16 under 35 U.S.C. § 102(b) as anticipated by Gonzales. To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently. In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). As stated in In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981) (quoting Hansgirg v. Kemmer, 102 F.2d 212, 214, 40 USPQ 665, 667 (CCPA 1939)) (internal citations omitted):

> Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient.

Appellants assert (brief, page 7) that Gonzales performs motion compensation prediction (MCP) at two or more resolutions, but that all MCP units share the same (appropriately scaled) motion vector data, and that Gonzales preserves the motion vector (appropriately scaled), corresponding to any resolution. It is argued (id.) that "[n]owhere does Gonzales describe the two searches in the steps of Appellants' claims 1 and 5 of (1) performing a search using down sampled data and (2) performing a refinement search around the offset of the motion vector found in the first search using non-downsampled data." Appellants further argue (id., page 8) that while Gonzales shows coding at two or more resolutions using a single (scaled) motion vector, that Gonzales does not describe using the motion vector from one search in a subsequent refinement search, and that Gonzales performs no subsequent search at all, but instead encodes data at multiple resolutions using a single motion vector. With respect to independent claim 15, appellants assert that Gonzales does not describe performing a hierarchical first search, and a refinement second search around the offset of the best match, and does not describe any apparatus for performing the two searches.

The examiner responds by asserting (answer, page 8) that:

> Gonzales et al clearly teaches at column 8, lines 11-25 that preserving the macroblock identity simplifies significantly the derivation of motion estimation vector data for all resolution scales other than the highest resolution and essentially that the motion vector data corresponding to any resolution scale can be derived from the highest resolution motion vector data by appropriately scaling it down. And in an alternative way, the full resolution motion vectors can be derived by appropriate scaling up of lower resolution motion vectors, and wherein additional correction (i.e., refinement) may be added at the higher resolution scale (i.e. non-down sampled data) to improve the precision of the motion vector data. As such, Gonzales shows the same coding using the motion vector from one search in a subsequent refinement search and it is still the Examiner's opinion that Gonzales et al anticipates the claimed limitations of performing a search using down sampled data and performing a refinement search around the offset of the best match macroblock.

We find that Gonzales discloses (col. 6, lines 7-12) that "[i]t is one object of this invention to preserve the identity of MBs across a multiplicity of scales such that the overhead is included only once, except perhaps for the refinement of some parameters such as the accuracy of the motion vectors," and (col. 8, lines 19-24) that "[a]lternatively, the full resolution motion vectors can be derived by appropriate scale up of lower resolution motion vectors. In the latter case, an additional correction may be added at the higher resolution scale to improve the precision of the motion vector data."

From this disclosure of Gonzales, we agree with the examiner that the language "additional correction may be added

. . . to improve the precision of the motion vector data" and "refinement of some parameters such as the accuracy of the motion vectors" refers to a refinement of the motion vector data.

Appellants respond to the examiner's position (reply brief, page 2) by asserting that:

> Gonzales mentions an additional correction in only one line of the summary of the invention section and it is never discussed anywhere else in the specification. How the additional correction could be carried out after the lower resolution vectors are scaled up is not explained and apparatus for doing so is not provided.

In our view, notwithstanding the fact that Gonzales makes brief mention of providing additional correction, Gonzales nevertheless does disclose providing as an alterative, additional correction at the higher resolution scale to improve the precision of the motion vector data. With regard to appellants' assertion that Gonzales does not discuss how the additional correction should be carried out, the examiner (answer, page 4) makes broad reference to figures 12a and 12b, and columns 3, 4, 8, and 12-14) for a teaching of, inter alia, "conducting a non-down sampled full pixel search using reconstructed refinement search data around the offset of the best match macroblock," after construction of the motion vector of offset between the best match macroblock and the current

macroblock. In response to appellants' arguments, the examiner does not point to any specific showing in Gonzales of how the additional correction is performed. From our review of Gonzales, we agree with appellants (brief, page 8) that:

> Gonzales shows a single Motion Estimation Unit (bottom of his Fig. 12b) and states (col. 14, lines 3-6) that the results, i.e. the motion vector of this single Motion Estimation, can be shared since in his invention motion vectors are one of the attributes shared by macroblocks at all scales. Note that searching for a motion vector is done in a Motion Estimation unit, whereas motion compensation coding is performed in the remaining blocks of Gonzales' Fig. 12b (at three different scales), using the results i.e. motion vector of a single search.

Because we find no clear teaching in Gonzales that the additional correction is carried out by conducting a second or refinement search around the offset of the best match macroblock (claims 1 and 5) or best match diff/offset bus (claim 15), and the examiner has failed to point to any teaching or suggestion of how the additional correction is carried out in Gonzales, we find that the examiner is resorting to speculation in order to conclude that the additional correction referred to in Gonzales is carried out in the manner set forth in independent claims 1, 5, and 15.

From all of the above, we find that the examiner has failed to establish a prima facie case of anticipation of independent claims 1, 5, and 15 under 35 U.S.C. § 102(b). Accordingly, the

rejection of independent claims 1, 5, and 15, as well as claims 2, 6-9, and 16, dependent therefrom, is reversed.

We turn next to the rejection of claim 3 under 35 U.S.C. § 103(a) as unpatentable over Gonzales in view of Kopet.

The examiner relies upon Kopet (answer, pages 5 and 6) for a teaching of passing best match macroblock difference and offsets in daisy chain fashion. Appellants (brief, page 11) do not dispute the examiner's findings with respect of Kopet. However, we reverse the rejection of dependent claim 3 under 35 U.S.C. § 103(a) because: (a)the examiner has not shown that it would have been obvious to have carried out the "additional corrections" of Gonzales using the motion estimation unit of figure 12b; and (b)the examiner has not pointed out how Kopet makes up for the basic deficiencies of Gonzales.

We consider next the rejection of claims 11, 12, and 17 under 35 U.S.C. § 103(a) as unpatentable over Gonzales in view of Greenfield. The examiner (answer, pages 6 and 7) relies upon Greenfield for a teaching of half pixel and dual prime search means. Appellants (brief, page 11) do not dispute the examiner's findings with respect to Greenfield. However, we reverse the rejection of dependent claims 11, 12, and 17 because 103(a) because: (a)the examiner has not shown that it would have been

obvious to have carried out the "additional corrections" of Gonzales using the motion estimation unit of figure 12b; and (b)the examiner has not pointed out how Greenfield makes up for the basic deficiencies of Gonzales.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1, 2, 5-9, 15, and 16 under 35 U.S.C. § 102(b) is reversed. The examiner's decision to reject claims 3, 11, 12, and 17 under 35 U.S.C. § 103(a) is reversed.

REVERSED

JAMES D. THOMAS Administrative Patent Judge	)	
JOSEPH L. DIXON Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
STUART S. LEVY Administrative Patent Judge	)	

SSL/gjh

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APPEAL NO. 1999-2449 - JUDGE LEVY
APPLICATION NO. 08/745,584

APJ LEVY

APJ DIXON

APJ THOMAS

DECISION: **REVERSED**

Prepared By: GJH

DRAFT TYPED: 15 Aug 03

FINAL TYPED: